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Impact of preoperative dental anxiety on intraoperative pain perception during tooth extraction: a cross-sectional study

Tooba Saeed [a], Ahmad Liaquat [b], Ammar Niazi [c], Ijaz Ur Rehman [d], Salman Amin [a], Tahmasub Faraz Tayyab [e]

[a]*Assistant Professor, Department of Oral & Maxillofacial Surgery, University College of Medicine and Dentistry, The University of Lahore, Lahore.*
[b]*Associate Professor, Department of Oral & Maxillofacial Surgery, University College of Medicine and Dentistry, The University of Lahore, Lahore.*
[c]*Senior Registrar, Department of Oral & Maxillofacial Surgery, University College of Medicine and Dentistry, The University of Lahore.*
[d]*Assistant Professor, Department of Oral Medicine, University College of Medicine and Dentistry, The University of Lahore.*
[e]*Associate Professor, Department of Oral & Maxillofacial Surgery, Niazi Medical and Dental College, Sargodha.*
Correspondence: tooba.saeed@ucd.uol.edu.pk*

ABSTRACT

BACKGROUND & OBJECTIVE: Dental anxiety is a global concern. Due to this, patients may experience the same dental procedures differently. According to the literature, tooth extraction is a dental procedure that provokes a high level of dental anxiety. This study aims to explore the relationship between preoperative dental anxiety and intraoperative pain perception during tooth extraction. Identifying various factors that trigger dental anxiety is important for understanding psychological influences on dental experiences.

METHODOLOGY: This cross-sectional study was conducted at the University Dental Hospital, The University of Lahore. After obtaining ethical approval, 195 participants were included. Corah's Dental Anxiety Scale and the Visual Analog Scale were used to measure anxiety level and pain perception. Statistical analyses, including one-way ANOVA and correlation tests, were performed using SPSS software (version 25.0) to evaluate the relationships between preoperative anxiety, intraoperative pain, and various influencing variables.

RESULTS: Findings showed a significant positive correlation between preoperative anxiety and intraoperative pain perception. Females exhibited higher anxiety levels than males. Patients with a history of previous extractions or those undergoing molar extractions had increased anxiety. Interestingly, patients with high to severe anxiety reported experiencing less pain, possibly due to the expertise of the treating surgeons.

CONCLUSION: The study highlights the intricate relationship between preoperative dental anxiety and intraoperative pain during tooth extraction. Insights obtained can help develop personalized care strategies, contributing to a broader understanding of psychological aspects in dental settings. Further research with varied populations is recommended to validate the study's findings.

KEYWORDS: Dental anxiety, Intraoperative Dental Pain, Tooth Extraction.

INTRODUCTION

Dental anxiety is an unpleasant emotional response during dental treatment. Irrespective of geographical location or demographic factors dental anxiety affects individuals, thus considered a global concern [1,2]. Various factors are involved in this multidimensional reaction to perceived danger [3].

Approximately one in seven dental patients experience high levels of anxiety in Western countries. More prone groups of individuals include young adults, females, and professionals. Factors that influence the anxiety level of patients are the frequency of dental visits and prior dental experiences. At the same time, procedures like local anesthesia and tooth extraction elicited higher scores on Corah's Dental Anxiety scale [2,4].

Dental anxiety is considered the fifth most prevalent form of anxiety worldwide. Literature shows it as a significant barrier to obtaining adequate dental care. The whole environment during dental procedures collectively activates the sensory system to produce dental anxiety [5].

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This anxiety leads to avoidance of dental treatment, appointment skipping, and delays that complicate the oral health issues of individuals. Now these complex dental issues need advanced dental procedures that further create fear and anxiety [6]. Highly anxious patients report more pain before dental treatment and they also expect more pain during and after the procedure [7]. During this whole cycle, parasympathetic dominance out of anxiety may lead to complications such as bradycardia, syncope, or cardiac arrhythmias [6-9]. Thus, evaluating patient anxiety levels preoperatively becomes essential for managing factors that can exacerbate anxiety.

All dental treatments do not trigger the same level of anxiety and fear, specific dental scenarios provoke different dental phobias. The most common triggers of dental anxiety include oral surgical procedures including dental extraction [10]. This dental anxiety then influences pain perception, posing challenges in managing intraoperative pain during tooth extraction, even with the judicious use of local anesthetics, analgesics, and anxiolytics [5,8,11].

The objective of this study is to explore the patient's perception of pain during tooth extraction and its correlation with preoperative anxiety level, emphasizing the interaction between psychological factors and pain experiences in the dental setting.

METHODOLOGY

This cross-sectional study was conducted at the University Dental Hospital, the University College of Dentistry, and The University of Lahore, from February 2021 to August 2021. Ethical approval (Ref No: UCD/ERCA/21/03ae) from the Ethical Review Board of the University College of Dentistry, The University of Lahore was received. The sampling technique was convenient sampling. The sample size of 195 was determined with a 10% margin of error and a 95% confidence level formula ($n = ZP(1-P)/d^2$).

Patients who provided informed consent for tooth extraction were included. Patients less than the age of 12 years were excluded from our study. Furthermore, patients who had already taken antianxiety drugs were not included in the study. Participants completed a Corah Anxiety Dental Scale questionnaire before tooth extraction in a designated sitting area. Comprehensive data on demographics, tooth characteristics, operator status, history of prior tooth extraction, number of local anesthesia (LA) cartridges used, and extraction duration were documented.

Anxiety levels were measured using Corah's Dental Anxiety Scale categorized into mild, moderate, high, and severe anxiety. Additionally, the Visual Analog Scale (VAS) was employed to assess pain levels on a scale of 0-10 during tooth extraction. Statistical analysis involved using SPSS software (version 25.0) to evaluate quantitative variables like age, extraction duration, and VAS scores for means and standard deviations. Frequency analysis was performed on some qualitative factors, including anxiety scores, tooth type, tooth status, operator status, and number of LA cartridges. One-way ANOVA, chi-square tests, and ANOVA tests were used to compare intraoperative pain and preoperative anxiety levels, correlating preoperative anxiety with various factors. A significance level of $p < 0.05$ was employed for all analyses.

RESULTS

Among the 195 participants, 105 were male, and 90 were female, with an age range from 12 to 80 years and a mean age of 42.9±16.8 years. A substantial proportion (61.5%) had prior experience with tooth extraction. The distribution of extracted teeth revealed that molars were the most frequently extracted (74.9%), followed by premolars (16.9%), canines (5.1%), and incisors (3.1%). Decay was the predominant condition (55.9%) among the extracted teeth, followed by root fragments (27.2%) and endodontically treated teeth (16.9%).

Extractions were predominantly performed by house officers (44.1%), followed by postgraduate residents (33.8%), consultants (15.4%), and students (6.7%). On average, 2 local anesthesia (LA) cartridges were used per extraction, and the mean duration of the extraction procedure was 13.7±7.4 minutes. Intraoperative pain perception, measured on the Visual Analog Scale (VAS) ranging from 0 to 9, showed a mean pain perception of 3.6±2.4.

Statistical analyses revealed a significant association between preoperative anxiety levels and intraoperative pain perception (Table-I). The preoperative anxiety level was notably influenced by gender, previous history of extraction, type of tooth, and tooth status (Table-II). Females exhibited higher preoperative anxiety levels than males, with males generally experiencing mild to moderate anxiety, while females tended to have high to severe anxiety. Those with a history of previous tooth extraction and those undergoing molar tooth extraction displayed higher anxiety levels.

Table-I: Relationship between preoperative anxiety level and intraoperative pain perception.

Preoperative Level of Anxiety	n (%)	Intraoperative Pain (Mean ± Std)	P-value
0 to 8 -Mild Anxiety	81 (41.5)	3.25± 2.02	≤0.001
9 to 12 Moderate Anxiety	47 (24.1)	5.13± 1.99	
13 to 14 -High Anxiety	25 (12.8)	2.92± 2.43	
15 to 20 - Severe Anxiety	42 (21.5)	3.31±2.94	
Total	195 (100.0)	3.67±2.42	

Table-II: Relationship between preoperative anxiety level with respect to; gender, previous history of extraction, type of tooth, and status of tooth extracted.

Variables	Categories	Preoperative Anxiety Level			P-value
		Mild-Moderate n %	High Anxiety n %	Severe anxiety n %	
Gender	Male	82(64.1)	4(16.0)	19(45.2)	≤0.001*
	Female	46(35.9)	21(84.0)	23(54.8)	
Previous history of extraction	Yes	90(70.3)	21(84.0)	9 (21.4)	≤0.001*
	No	38(29.7)	4(16.0)	33(78.6)	
Type of tooth	Molars- Premolars	115(89.8)	24(96)	40(95.2)	0.449**
	Canine- Incisor	13(10.2)	1 (4.0)	2 (4.8)	
Status of tooth	Decayed	99(77.0)	5 (20.0)	5 (11.9)	≤0.001**
	Root fragment	26(20.3)	14(56.0)	13(31.0)	
	Endodontically treated tooth	3(2.3)	6 (24.0)	24(57.1)	

Note: Independent sample t-test*, One Way ANOVA**

Conversely, the relationship between intraoperative pain and gender, type of tooth, and history of extraction did not yield statistical significance. However, a significant association was found concerning the status of the extracted tooth and the operator's status. Specifically, extractions of decayed teeth were associated with higher pain levels, while patients treated by consultants experienced comparatively less pain (Table-III). The Pearson correlation analysis revealed that age, duration of extraction, and the number of local anesthesia cartridges were positively correlated with intraoperative pain during tooth extraction. Statistically significant p-values (< 0.05) indicate that these factors may influence the level of pain perceived by patients during the procedure. (Table-IV)

Table-III: Relationship between intraoperative level of pain with respect to; gender, previous history of extraction, type of tooth, and status of tooth extracted.

Intraoperative level of pain (VAS)				
		n	Mean± SD	P-value
Gender	Male	105	3.71± 2.26	0.792*
	Female	90	3.62± 2.61	
Type of Tooth	Molar	146	3.83± 2.39	0.057**
	Premolar	33	3.00± 2.03	
	Canine	10	4.60± 3.66	
Status of Tooth	Incisor	6	2.00± 1.90	≤0.001**
	Decayed	109	4.47± 2.28	
	Root fragment	53	2.30± 2.15	
	Endodontically treated tooth	33	3.24± 2.28	
History of Extraction	Yes	120	3.78± 2.38	0.454*
	No	75	3.51± 2.51	
Operator Status	Student	13	3.08± 2.87	≤0.001**
	HO	86	3.94± 2.52	
	PG	66	4.59± 1.86	
	Consultant	30	1.13± 0.78	

Note: Independent sample t-test*, One Way ANOVA**

Table-IV: Correlation of various variables.

	Pearson Correlation, r	P -value
Intraoperative pain; Age	0.177*	0.013
Intraoperative pain; Time of extraction	0.226**	0.001
Intraoperative pain; No. of LA cartridges	0.265**	0.000

DISCUSSION

Despite the established association of preoperative anxiety level of patients with adverse perioperative outcomes, assessment of preoperative anxiety before dental procedures. Tooth extraction, often induces significant anxiety in patients, impacting their overall experience. Our study aimed to identify heightened anxiety using Corah's Anxiety test and explored various factors influencing preoperative pain during tooth extraction. The results indicated a significant correlation between preoperative anxiety levels and intraoperative pain perception. However, it is essential to acknowledge the multifactorial nature of anxiety and pain perception during dental procedures.

Comparing our findings with previous studies, the prevalence of preoperative anxiety in dental patients aligns with reported rates, emphasizing the need for targeted interventions [1,12]. Most of our patients exhibited mild to moderate anxiety. These results are consistent with the study conducted by ZEGAN et al [13]. Females consistently exhibited higher anxiety levels than males, a trend observed in various studies [14,15]. The study's novel aspect was that patients with high to severe anxiety experienced less pain during tooth extraction. This unexpected result may be attributed to the more experienced surgeons treating this group, aligning with the literature emphasizing the impact of surgeon competence on patient outcomes [16].

Additionally, our study concurred with patterns observed in tooth extraction studies in Nigeria, indicating that dental caries was the primary indication for extraction, with molars being the most commonly extracted teeth [17]. These findings highlight the global consistency in dental extraction patterns and reasons for seeking dental care.

The relationship between dental anxiety and local anesthesia effectiveness, as explored in previous studies, resonates with our results [18]. Moreover, the identification of factors such as gender, age, and previous negative dental experiences as predictors of dental anxiety emphasizes the need for personalized approaches to patient care [19].

Although our study offers valuable insights, certain limitations must be acknowledged. The focus on a specific population and a single-center setting may restrict the broader applicability of the findings. The reliability of anxiety and pain assessment can be affected by reliance on self-reported data.

CONCLUSION

our study highlighted the relationship between preoperative anxiety and intraoperative pain during tooth extraction. Understanding the effects of various factors on patient pain and anxiety is essential for developing targeted interventions to improve outcomes. Further research is needed with a larger sample size including a diverse population, to validate our findings.

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Authors' Contribution:

Tooba Saeed: Substantial contributions to the conception and design of the work.
Ahmad Liaquat: Drafting the work.
Ammar Niazi: Acquisition and analysis of data for the work.
Ijaz Ur Rehman: Interpretation of data for the work.
Salman Amin: Reviewing it critically for important intellectual content.
Tahmasub Faraz Tayyab: Final approval of the version to be published.

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